

### Abstract

A Spin Valve GMR and Spin Filter SVGMR configuration where in the first embodiment an important buffer layer is composed of a metal oxide having a crystal lattice constant that is close to the 1<sup>st</sup> FM free layer's crystal lattice constant and has the same crystal structure (e.g., FCC, BCC, etc.). The metal oxide buffer layer enhances the specular scattering. The spin valve giant magnetoresistance (SVGMR) sensor comprises: a seed layer over the substrate. An important metal oxide buffer layer (buffer layer) over the seed layer. The metal oxide layer preferably is comprised of NiO or  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>. A free ferromagnetic layer over the metal oxide layer. A non-magnetic conductor spacer layer over the free ferromagnetic layer. A pinned ferromagnetic layer (2<sup>nd</sup> FM pinned) over the non-magnetic conductor spacer layer and a pinning material layer over the pinned ferromagnetic layer. In the second embodiment, a high conductivity layer (HCL) is formed over the buffer layer to create a spin filter -SVGMR. The HCL layer enhances the GMR ratio of the spin filter SVGMR. The third embodiment is a pinned FM layer comprised of a three layer structure of a lower AP layer, a spacer layer (e.g., Ru) and an upper AP layer.